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explicit avowal that his primary concern is with the practical and not the esthetic stiles complaint while it leaves regret. Fortunately the splendid series of plates affords material for a study of this character which has never before been available to any one to whom our large museums are inaccessible.

Filled as they are with descriptive detail, Professor Mason's pages do not lend themselves to quotation in a notice of this character. The scope of his work has been indicated. Suffice it to say that it is a big book and a good book and we are grateful.

LIVINGSTON FARRAND.

COLUMBIA UNIVERSITY.

The Paleontology and Stratigraphy of the Marine Pliocene and Pleistocene of San Pedro, California. By RALPH ARNOLD. Memoirs of the California Academy of Sciences, Vol. III., pp. 420, pls. 37, 4to.

This memoir is the most important contribution to the invertebrate paleontology of the west American Cenozoic that has appeared since the publication of Gabb's 'Paleontology of the California Survey.' The author has worked very carefully over both the stratigraphy and the paleontology of the marine Pliocene and Pleistocene of California, obtaining more satisfactory results than have been reached by previous workers in paleontology. The field and laboratory work upon which the paper is based occupied the author for a large part of his time during nearly six years and every problem which presented itself has been carefully worked out to the minutest details. The paper was prepared at Stanford University, where the work was carried on under the able supervision of Professor James Perrin Smith.

The memoir is divided into two main divisions: Part I., a general discussion of the stratigraphy, faunal succession and faunal geography; Part II., a purely zoological discussion of the numerous forms represented in the faunas. Over four hundred species of invertebrates were obtained and this large number gives more than ordinary weight to the conclusions drawn by the writer.

The Pleistocene formations occurring at

San Pedro have been designated by Dr. Arnold as the San Pedro series. This is divided into an upper and a lower division, which are separated by an unconformity. The fauna of the lower San Pedro includes 247 species, of which 12.5 per cent. are extinct. Of this number 64 per cent. of the species are now living at San Pedro, 17.4 per cent. are living only north of San Pedro, 3.2 per cent. only south of San Pedro. The conclusion is drawn that this is a cold-water fauna. The upper San Pedro fauna includes 252 species, of which 9.5 per cent. of the species are extinct. Of this number 68.2 per cent. are now living at San Pedro, 6.1 per cent. only north of San Pedro, 14.2 per cent. only south of San Pedro. The fauna of the upper San Pedro series more nearly resembles that found living on the Pacific Coast two or three hundred miles south of San Pedro. In other words, this is a warm-water fauna.

In addition to a careful discussion of the extensive series of species described from San Pedro, the author has studied a large number of other Pleistocene localities on the coast of California and has presented a valuable correlation table.

The author makes an interesting comparison of the faunas of the Californian and Japanese coasts in Pleistocene time, and has brought out the fact that the relationship was much closer then than it is now. As the lower San Pedro fauna of California is boreal, it is to be supposed that the northern fauna would also push down the Asiatic coast. In addition to this, the presence of a broad submarine shelf would make possible the interchange of species.

In Part II. of his paper Dr. Arnold has described many new and important species. He has made an equally important contribution in the redescription and figuring of a large number of species which have never been satisfactorily described or figured. This portion of the memoir will be of almost as much value to students of recent and Tertiary faunas as it will be to those who interest themselves in the life of the Quaternary.

The author and the editorial staff of the California Academy are to be congratulated

on the very satisfactory form in which the memoir appears. The arrangement of the material, the typography and the character of the illustrations are all worthy of favorable comment.

JOHN C. MERRIAM.

SCIENTIFIC JOURNALS AND ARTICLES.

THE contents of the April number of the *American Journal of Mathematics* are as follows:

HENRY LEWIS RIETZ: 'On Primitive Groups of Odd Order.'

A. N. WHITEHEAD: 'Theorems on Cardinal Numbers.'

T. J. F. A. BROMWICH: 'The Caustic, by Reflection, of a Circle.'

HARRY WALDO KUHN: 'On Imprimitive Substitution Groups.'

THE *American Journal of Psychology* for January contains the following articles:

W. P. MONTAGUE: 'A Theory of Time-Perception.'

BENJAMIN RICHARDS ANDREWS: 'Auditory Tests.'

E. B. TITCHENER: 'Some New Apparatus.'

I. M. BENTLEY and E. B. TITCHENER: 'Ebbinghaus' Explanation of Beats.'

C. SPEARMAN: 'The Proof and Measurement of Association Between Two Things.'

I. M. BENTLEY: 'Professor Cattell's Statistics of American Psychologists.'

THE first number of the *Journal of Comparative Neurology and Psychology* as recently reorganized appears in March with contents as follows: 'The Relation of the Motor Endings on the Muscle of the Frog to Neighboring Structures,' by John Gordon Wilson. A description with illustrations of the motor nerve endings with special reference to the ultra-terminal fibrils and the relation of the ending to the sarcolemma. 'Space Perception of Tortoises,' by Robert M. Yerkes. A quantitative study of the amount of hesitation exhibited by different species of tortoises before crawling over the edge of an elevated board and correlation of these data with the natural habits of the species studied. 'A Note on the Significance of the Form and Contents of the Nucleus in the Spinal Ganglion Cells of the Fœtal Rat,' by Shinkishi Hatai. A cytological examination of de-

veloping spinal ganglion cells to determine the functional significance of the centrosome, aster and Nissl granules and their relations to the nucleus, illustrated by two plates. 'An Establishment of Association in Hermit Crabs,' by E. G. Spaulding. A demonstration that the hermit crab is capable of profiting relatively rapidly by experience. Editorials, a summary of the neurological papers read at the mid-winter meetings and reviews complete the number.

THE March number of the *Botanical Gazette* contains a contribution from John F. Garber on 'The Life History of *Ricciocarpus natans*,' the investigation having resulted in a very complete morphological study, to which are appended biological data derived chiefly from observation of the plant in the field during one season and from experimental work in the laboratory.—Mabel L. Merriman publishes the results of her long study of 'Vegetative cell division in *Allium*,' this being one of the few complete studies of karyokinesis in vegetative cells of plants.—John Donnell Smith publishes his twenty-fifth paper entitled 'Undescribed plants from Guatemala and other Central American republics.'—Charles Thom describes *Craterellus taxophilus* as a new species of Thelephoraceæ.—J. M. Greenman publishes notes on the indigenous Centaureas of North America, describing one new species.—W. J. Beal makes another contribution to the vitality of seeds.

SOCIETIES AND ACADEMIES.

THE AMERICAN PHILOSOPHICAL SOCIETY.

THE general meeting of the society will be held on April 7, 8 and 9, in the hall of the society in Independence Square (104 South Fifth Street), Philadelphia.

Morning sessions, 10:30 A.M. to 1 P.M. Afternoon sessions, 2 to 4:30. Luncheon will be served in the rooms of the society from one to two o'clock. A reception will be given to the members and the ladies accompanying them at the Free Museum of Science and Art of the University of Pennsylvania on Thursday evening, April 7. The visiting members will be the guests of the resident members of